

# **INTRODUCTION TO SUPERABRASIVES**

## **Book I: Superabrasives Basics**

### **Diamond and CBN**

A Self-Study Programmed Instruction Course  
Developed by Norton Company

© 1993 by Norton Company. All copyrights reserved by Norton  
Company, Worcester, Massachusetts, United States of America.

## SECTION 1 INTRODUCTION TO SUPERABRASIVES

6

The range of Norton products covered by the term **super-abrasives** includes the following:

- Diamond Bonded Products
- CBN (Cubic Boron Nitride) Bonded Products
- Diamond Single Layer Products
- CBN (Cubic Boron Nitride) Single Layer
- Diamond Truing and Dressing Tools

In this three-volume study program we will consider all five.

It is recommended that you first complete the Bonded Abrasive self-study programmed instruction course, since many of the basic concepts of bonded wheel manufacture are described in greater detail in that program.

### HISTORY OF SUPERABRASIVES

**Superabrasives** is a term referring to diamond and cubic boron nitride (CBN) — abrasives of extreme hardness which produce outstanding results on materials that cannot be ground or cut easily by conventional abrasives. Superabrasives have made it possible to penetrate and cut the hardest natural and man-made materials. Diamond and CBN, themselves, are two of the hardest materials known.

The diamond or CBN particles are referred to as the **abrasive**. An abrasive particle performs the same function as the tooth of a saw.

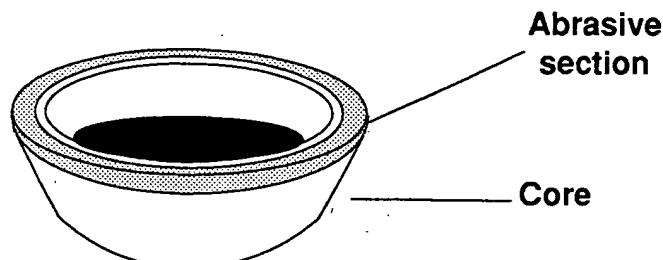
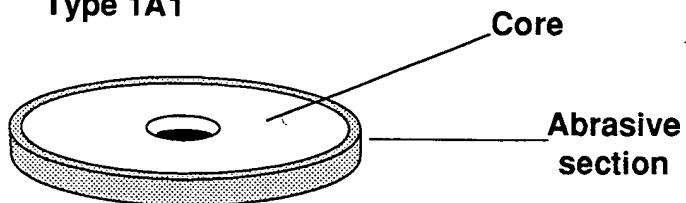
## SECTION 2 SUPERABRASIVE WHEEL BASICS

20

Superabrasive wheels are composed of abrasive particles held together by the appropriate bond material. Because of the diversity in manufacturing operations, the different types and sizes of parts to be ground and the many kinds of grinding machines, it is necessary to make wheels in a variety of shapes and sizes.

### Basic Grinding Wheel Shapes

**Straight Wheel  
Type 1A1**



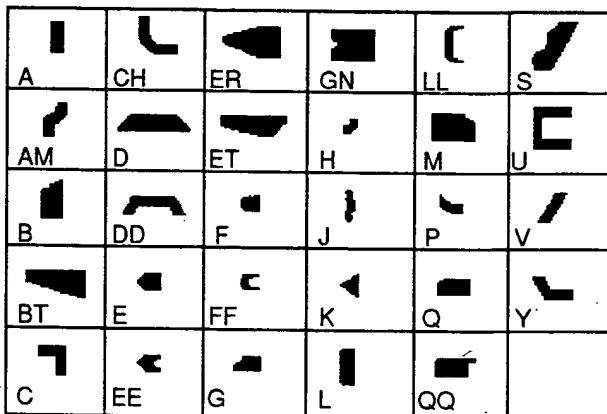
**Cup Wheel**

Generally, superabrasive wheels use either the periphery or the side as the abrasive surface. The **Type 1A1 straight wheel** is the simplest form of a peripheral grinding wheel. The **Type 11V9 flaring-cup wheel** is the most popular tool room wheel whose grinding face is on the side. All other wheel shapes are modifications of these two.

Usually, superabrasive products have a two-part construction:

1. a core made of a material such as aluminum
2. the diamond or CBN section containing the superabrasive particles.

## DIFFERENT SHAPES OF DIAMOND/CBN SECTION



There are \_\_\_\_\_ types of diamond and CBN shapes available for superabrasive products.

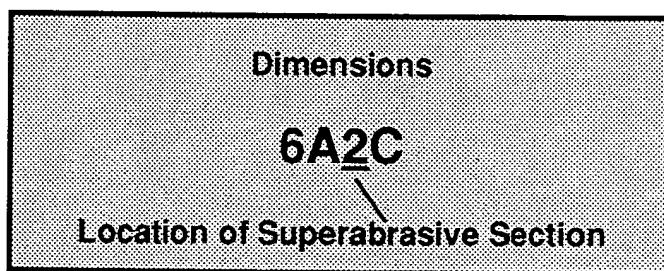
- A. 19
- B. 29
- C. 39

B. 29

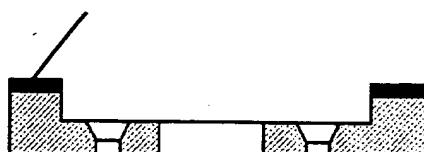
## LOCATION OF THE SUPERABRASIVE SECTION

31

The third position indicates the location of the diamond or CBN section on the core. A number is used to indicate one of 10 locations.

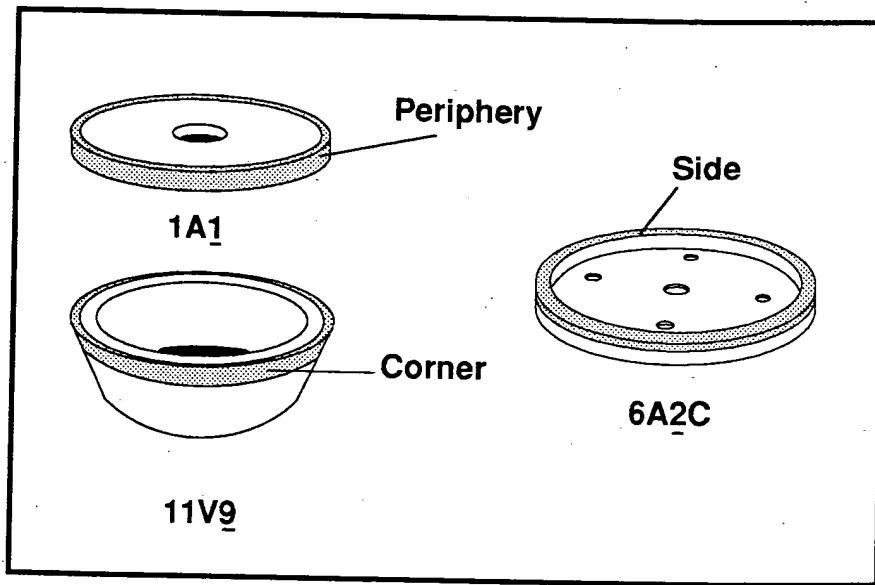


Location of Superabrasive Section



The numbers represent the following locations:

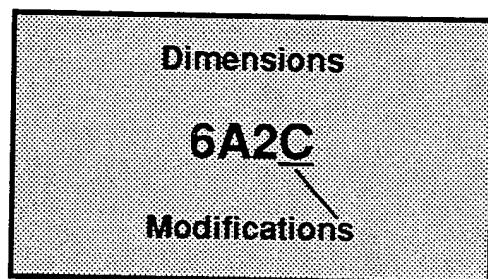
- 1. Periphery
- 2. Side
- 3. Both sides
- 4. Inside bevel or arc
- 5. Outside bevel or arc
- 6. Part of periphery
- 7. Part of the side
- 8. Throughout
- 9. Corner
- 10. Annular



## MODIFICATIONS

32

The fourth position indicates modifications to the wheel shape. A single or double letter (from B to Y) is used to designate one of 17 possible modifications.



In this case, the letter C stands for *Drill and Countersink*. The modifications are explained in detail in the latest Norton Specification Manual.